Remarks

The claims have been amended, support for which can be found throughout the specification and the claims as originally filed. The amendments to the claims do not add new matter.

Specification

The specification was objected to for recitation of an embedded hyperlink. The specification has been amended to overcome this objection. The amendments to the specification do not introduce new matter.

In response to the restriction requirement, the Applicants have elected Group I (claims 26-41, 45-46 and 51-58) which includes claims 27, 29, 31, 35-41, 45-46 and 51-56. Claims 27, 29, 31, 35-41, 45-46 and 51-56 were withdrawn from further consideration as being drawn to a nonelected invention. Applicants submit that these withdrawn claims were not previously identified as a separate election (see Restriction Requirement of February 18, 2010), and are linked by a generic claim or a linking claim. Applicants presume that these claims were withdrawn for claim 27 requiring allegedly requiring a third peptide, although not particular reason is presented in the Office Action of July 21, 2010.

Applicants submit that the withdrawal of claims 27 and the dependent claims 29, 31, 35-41, 45-46 and 51-56 cannot be sustained because claim 27 does not require a third peptide but a first and a second peptide only as in claim 26. Claim 26 requires a first peptide which is a C peptide of HCV and a second peptide which is another peptide of HCV, different from the first one. Claim 27, which depends from claim 26, requires that the second peptide is from the NS3 protein of HCV. Therefore claim 27 and the dependent claims 29, 31, 35-41, 45-46 and 51-56 require a first and a second peptide as in claim 26.

In response to the species election, the Applicants have elected the combination of HCV C peptide of amino acids 27-51 and HCV NS3 peptide of amino acids 1524-1553 which reads on claims 26-33, 35-41, 45, 46 and 51-58. Therefore, claims 27 and the dependent claims 29, 31, 35-41, 45-46 and 51-56 which are drawn to the elected invention should be examined with claims 26, 28, 30, 32, 33, 57 and 58.

Rejection under 35 USC § 101

Claims 26, 28, 30, 32, 33, and 57 were rejected on page 4 of the Office Action of July 21, 2010, for allegedly reading on a product of nature. The claims have been amended to specify that the peptides are isolated. In view of Applicant's amendments, it is believed that the basis for this rejection has been overcome and it is repectfully requested that this rejection be withdrawn.

Rejection under 35 USC § 112

A. Claims 26, 28, 30, 32, 33, 57, and 58 were rejected on page 4 of the Office Action for allegedly failing to particularly point out and distinctly claim the subject matter regarded as the invention. The Office Action on page 4 alleged that the claims were not clear as to whether binding is to four different types of molecule or four molecules of the same type. The claims have been amended to specify that the four different HLA molecules which are bound by the peptide are four different types of HLA II molecules. It is therefore respectfully submitted that Applicants amendments have overcome the basis for this rejection, and withdrawal of the rejection is respectfully requested.

B. Claims 26, 28, 30, 32, 33, 57, and 58 were rejected on page 5 of the Office Action for allegedly failing to comply with the written description requirement.

The Office Action on page 6 alleged that the specification does not provide written support for the genus of peptides of the C protein or NS3 proteins that binds at least four different types of HLA II molecules whose allelic frequency is greater than 5% in the Caucasian population.

Applicants have amended the claims to provide for an HCV peptide mixture comprising peptides of defined structure with binding activity <1000 nM to at least four different types of HLA II molecules predominant in the Caucasian population (allelic frequency >5%). The claimed peptides which bind to at least four different types of HLA II molecules predominant in the Caucasian population (predominant HLA II molecules) are disclosed in the specification (see in particular pages 12-17 of the present Application) and supported by the examples (see examples 1 and 2 page 27-36; Table III and figure 2 (long peptides of 15 to 34 amino acids); Table IV and figure 3 (short peptides of 15 amino acids)).

The claimed peptides which bind to at least four different types of HLA II molecules predominant in the Caucasian population (predominant HLA II molecules) are disclosed in the specification (see in particular pages 12-17 of the present Application) and supported by the examples (see examples 1 and 2 page 27-36; Table III and figure 2 (long peptides of 15 to 34 amino acids); Table IV and figure 3 (short peptides of 15 amino acids)).

The examples show that short as well as long peptides are capable of binding to predominant HLA II molecules (Table III and figure 2 (long peptides of 15 to 34 amino acids); Table IV and figure 3 (short peptides of 15 amino acids)). The examples also demonstrate that short peptides are capable of binding to at least four different types of predominant HLA II molecules (figure 3 and Table IX). The examples further demonstrate also that longer peptides that include the sequence of a defined short peptide (which binds to four different types of predominant HLA II molecules), also bind to four or more different types of predominant HLA II molecules (page 36, lines 21-25; Table III and figure 2 (long peptides of 15 to 34 amino acids); Table IV and figure 3 (short peptides of 15 amino acids)).

For example, the short peptide C 27-41 binds to four different types of predominant HLA II molecules (figure 3). The long peptide C 19-47 which includes the peptide C 27-41 and overlaps with the long peptide C 31-57 on positions 31-47 (figure 1) binds to seven different types of predominant HLA II molecules including the six different types of predominant HLA II molecules bound by the peptide C31-57(figure 2).

The peptide C 27-51 also binds to at least four different types of predominant HLA II molecules (page 12, lines 31-36; page 15, lines 6-20) because it includes: (i) the peptide C 27-41 which binds to four different types of predominant HLA II molecules and (ii) the amino acid sequence 31-47 which binds to six different types of predominant HLA II molecules. The binding activity of the peptide C 27-51 to at least four different types of predominant HLA II molecules is confirmed in a later publication from the inventors (Castelli *et al.* Eur. J. Immunol., 2007, 37, 1513-1523 herewith attached; see in particular Table 3, page 1518). The Table 3 of Castelli *et al.* shows that the peptide C 27-51 which includes the peptide C 27-41 binds with a binding activity <1000 nM to all the HLA-DR molecules that are bound by C 27-41 (HLA-DR11 and HLA-DR15; figure 3 of the present application) as well as to four additional predominant HLA-DR molecules (HLA-DR1, HLA-DR7, HLA-DR13 and HLA-DRB5). In addition, the inventors have confirmed that like C 27-41, C 27-51 binds also to HLA-DP4 molecules (binding activity of 823 nM and 170 nM for respectively HLA-DP401 and HLA-DP402). Therefore, contrary to what is stated by the Examiner on pages 6-7 of the instant Office Action, the peptide C27-51 meets the functional features as claimed.

Accordingly, the claims, as amended, are supported by the specification, demonstrating that Applicants were in possession of the claimed invention. It is therefore respectfully submitted that Applicants amendments to the claims have overcome the basis for this rejection and it is requested that this rejection be withdrawn.

C. Claims 26, 28, 30, 32, 33, 57, and 58 were rejected on page 9 of the Office Action for allegedly for not being enabled by the specification. The Office Action on page 9 acknowledged that the specification enables an HCV immunogenic composition comprising a peptide mixture where the peptides are of defined structure, but not where the peptides are derived from HCV.

The claims have been amended to provide for an HCV peptide mixture comprising peptides of defined structure which bind with a binding activity <1000 nM to at least four different types of HLA II molecules predominant in the Caucasian population (allelic frequency > 5%), which is enabled by the specification as indicated by the Examiner (page 9 of the Office Action). Accordingly, Applicants submit that the amendments to the claims have overcome the basis for this rejection, and withdrawal of the rejection is respectfully requested.

Rejection under 35 USC § 102(b)

Claims 26, 28, and 30 were rejected on page 12 of the Office Action of July 21, 2010, for allegedly being anticipated by Godkin.

The amended claims have been amended to provide for HCV peptide mixture comprising one or more of a C peptide selected from the peptides consisting of positions 19-47, 27-41, 27-51, 31-57, 104-133, 127-167, 127-149, 131-148, 131-167, 134-148 and 148-167 of the HCV protein. Godkin discloses a peptide mixture comprising one or more of a C peptide which is included between amino acids 31-45 and 141-155 of the HCV protein. Therefore, Godkin fails to disclose the claimed C peptides. Accordingly, Applicants repectfully request withdrawal of this rejection.

Rejection under 35 USC § 103(a)

Claims 26, 28, 30, 32, 33, 57, and 58 were rejected on page 13 of the Office Action of July 21, 2010, for allegedly being obvious over Godkin in view of Berzofsky, Hoffman, Hiranuma, and Zebedee.

The deficiencies of Godkin with respect to claims 26, 28, and 30 are addressed above. Berzofsky is relied on for teaching core peptides that bind motifs for human HLA antigen. Hoffman is relied on for teaching core protein ranges from amino acids 1-115 and that the NS3 region ranges from 1007-1534. Hiranuma teaches compositions to induce an immune response in a subject, the composition comprising conjugated peptides of different HCV epitopes. Zebedee discloses HCV antigens for detection of antibodies against the antigens.

The amended claims provide for an HCV peptide mixture comprising one or more of a C peptide selected from the peptides consisting of positions 19-47, 27-41, 27-51, 31-57, 104-133, 127-167, 127-149, 131-148, 131-167, 134-148 and 148-167 of the HCV protein. No combination of Godkin, Berzofsky, Hoffman, and Hinamura discloses or suggests these peptides. Further, the skilled artisan would have not been able to arrive at the claimed invention because the cited references do not represent a finite number of options which are easily traversed to arrive at the subject matter of the amended claims (see revised examination guidelines at 72 Fed. Reg. 57526). Accordingly, no combination of these references renders the claims obvious. It is therefore respectfully requested that this rejection be withdrawn.

Conclusion

The foregoing amendments and remarks are being made to place the application in condition for allowance. Applicants respectfully request entry of the amendments, reconsideration and the timely allowance of the pending claims. A favorable action is awaited. Should the Examiner find that an

interview would be helpful to further prosecution of this application, he is invited to telephone the undersigned at his convenience.

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